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None

(58) Field of search

UK CL (Edition K) B6F FAM FAV FG FKG FKH

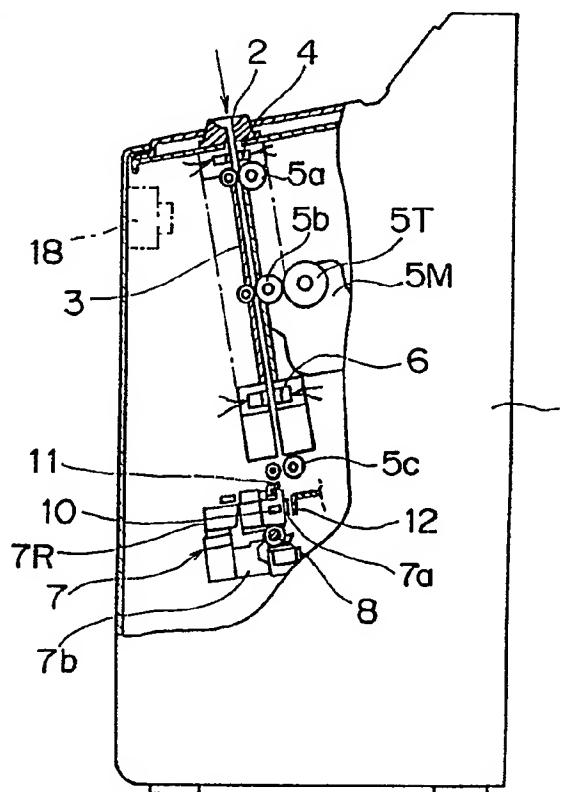
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(54) Printing at prerequisite positions on a record carrier

(57) A time-card printer, which is adopted to print in desired ones of an array of rows and columns of predestined record receiving areas, and which prints a locating indicium in a said area when it prints a record therein, characterised in that the printhead (7) is traversable along the row direction and has a first sensor (10) secured thereto in such position as to detect locating marks arranged in a row, and wherein there is provision for mutually moving the record card and the printhead in the direction of the columns and the printhead also has a second detector (11) secured thereto in such position as to detect locating marks arranged in a column.

The first detector (10) is mounted one columns width ahead of the print position, and the second detector (11) is mounted one row height higher than the other.

FIG. 1



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FIG. 1

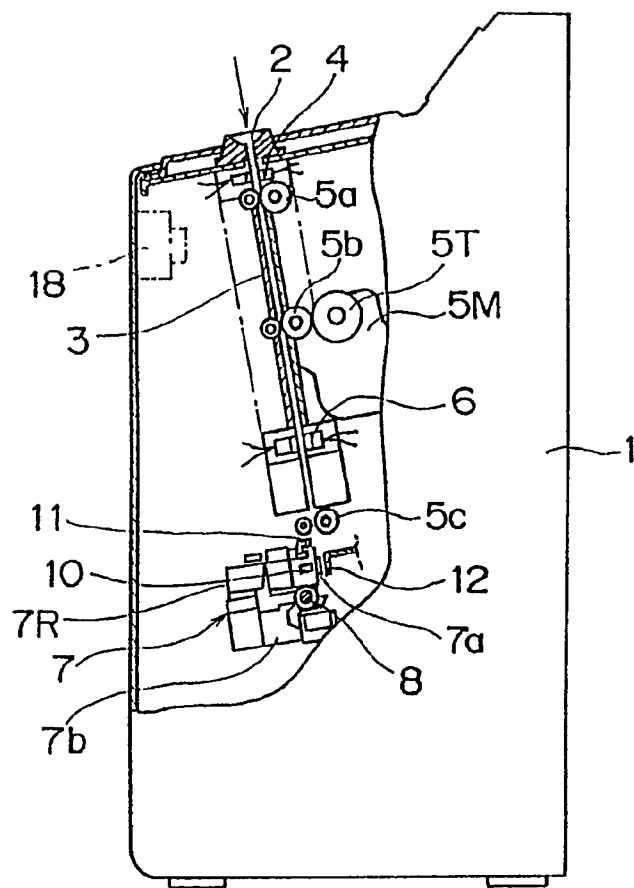


FIG. 2

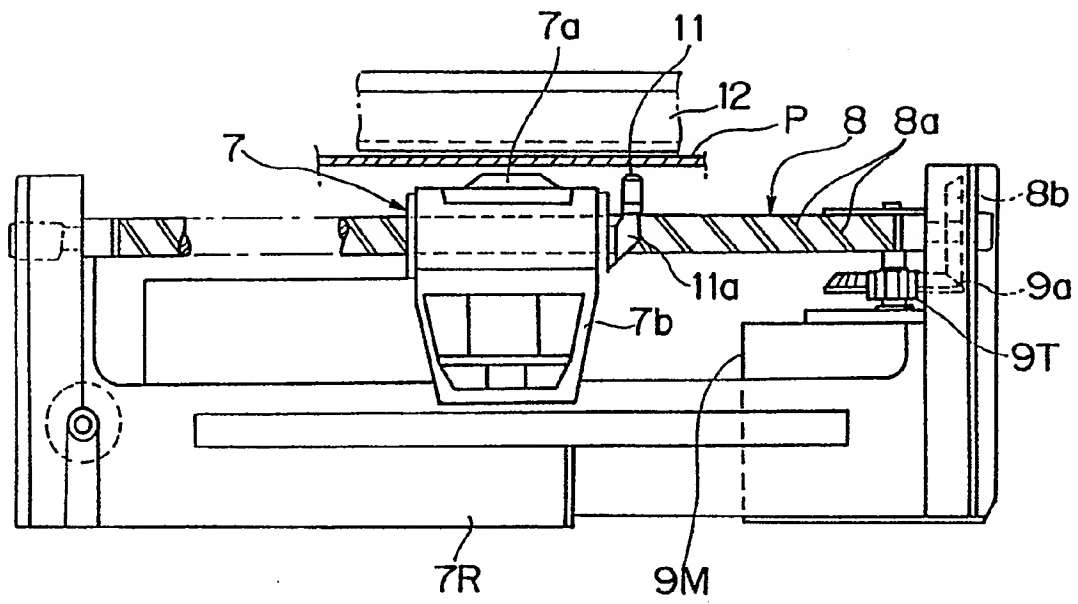
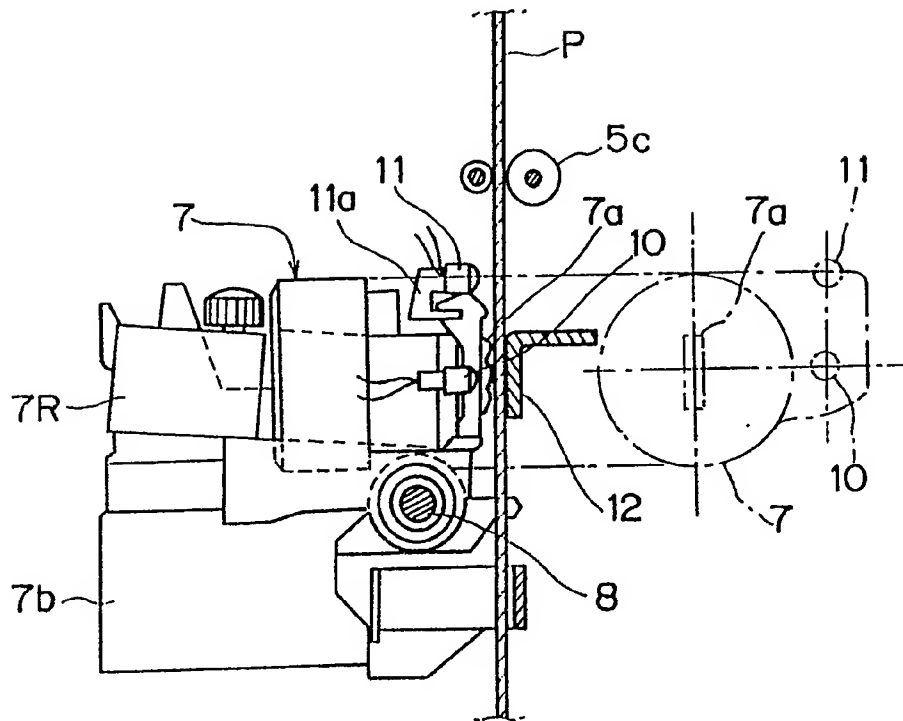


FIG. 3



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FIG. 4

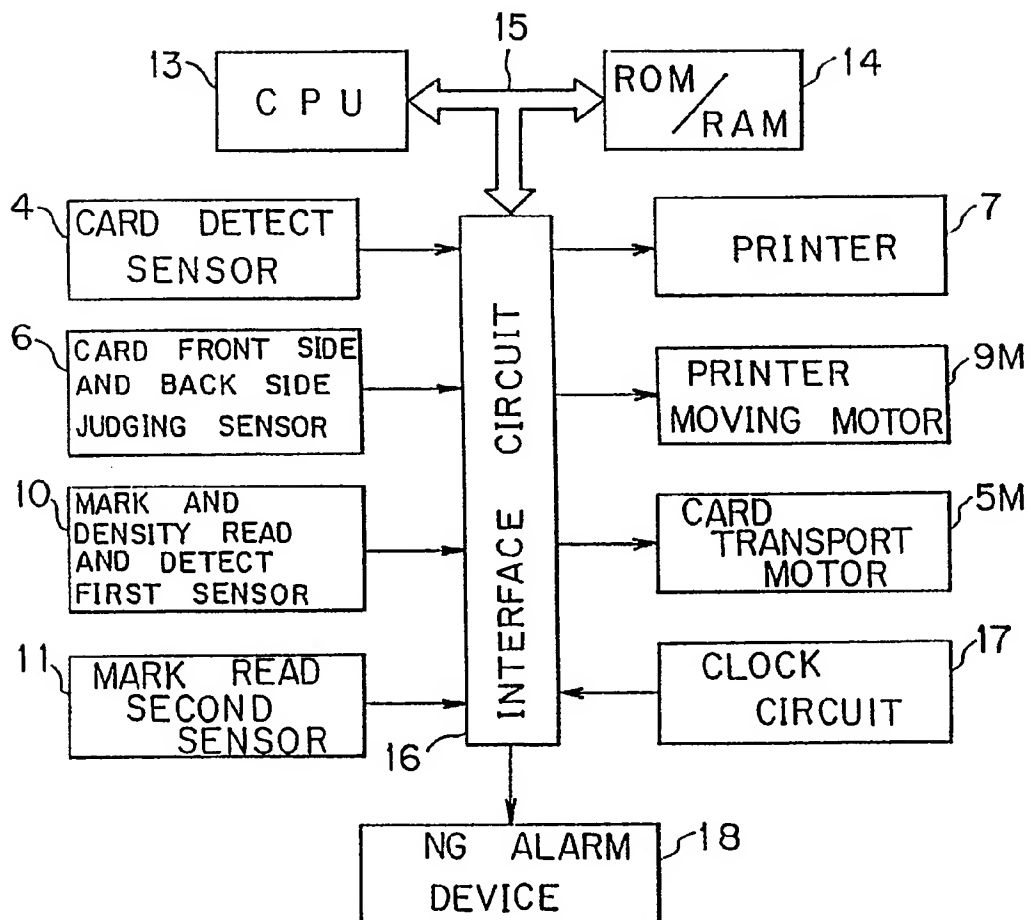


FIG. 5

Figure 1 is a schematic diagram of a portable electronic device 100. The device 100 includes a display screen 102. The display screen 102 is divided into a top section 104 and a bottom section 106. The top section 104 contains a table with two columns: "No." and "NAME". The bottom section 106 contains a table with ten columns: "In", "Out", "1", "2", "3", "4", "5", "6", "7", and "Total". The table in the bottom section 106 is divided into two parts by a horizontal line. The top part of the bottom section table contains data for "In" and "Out" transactions. The bottom part of the bottom section table is empty. A label "MK" points to the "In" and "Out" columns. A label "PA" points to the top section 104. A label "PA1" points to the bottom section 106.

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FIG. 6

No. NAME

PB

	1	2	3	4	5	6	7	Total
Out								
In								
Out								
In								
Out	20:10							
In	14:25							
Out	20:00	17:10						
In	8:30	8:29						

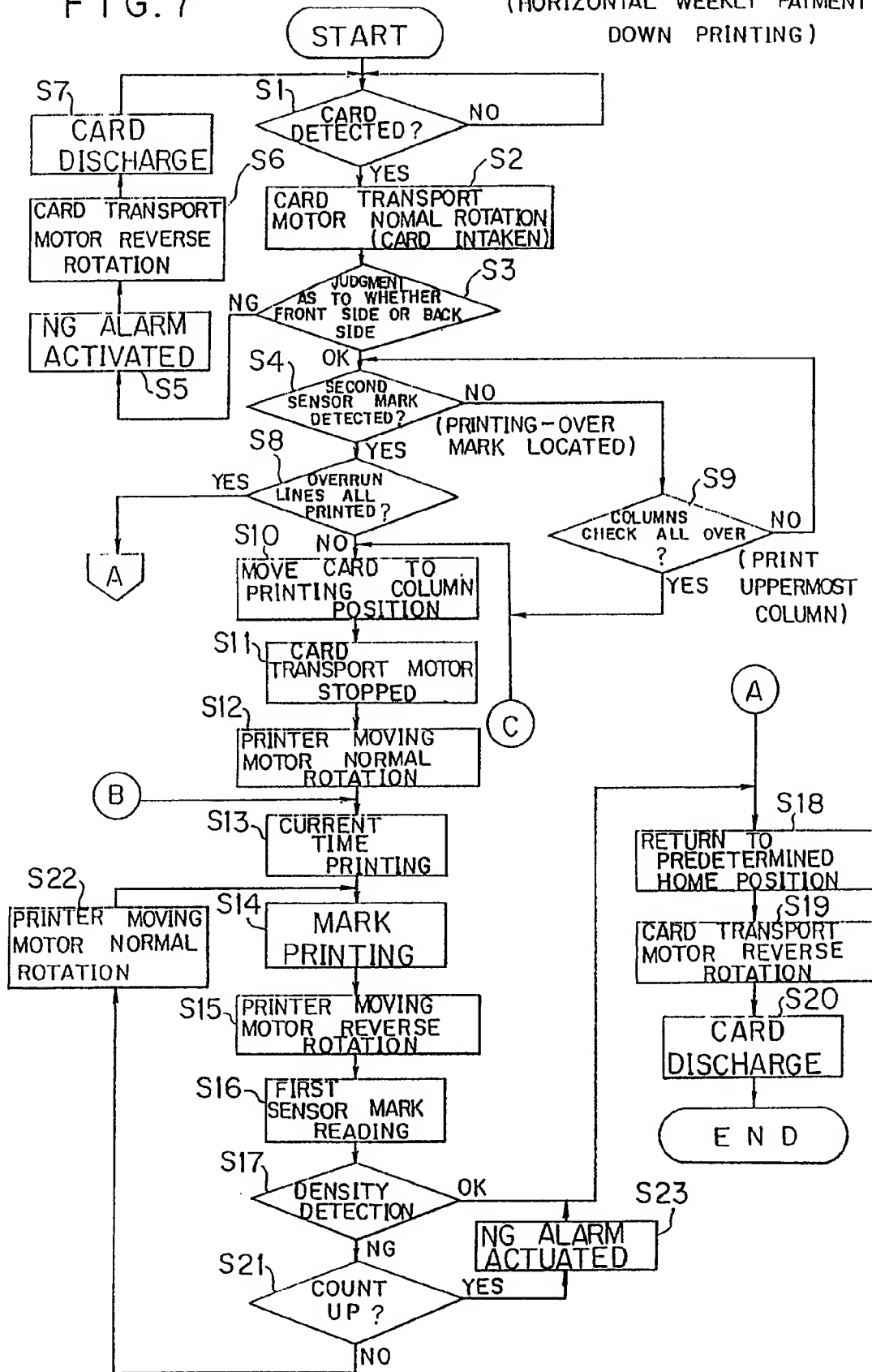
MK

MK

PB1

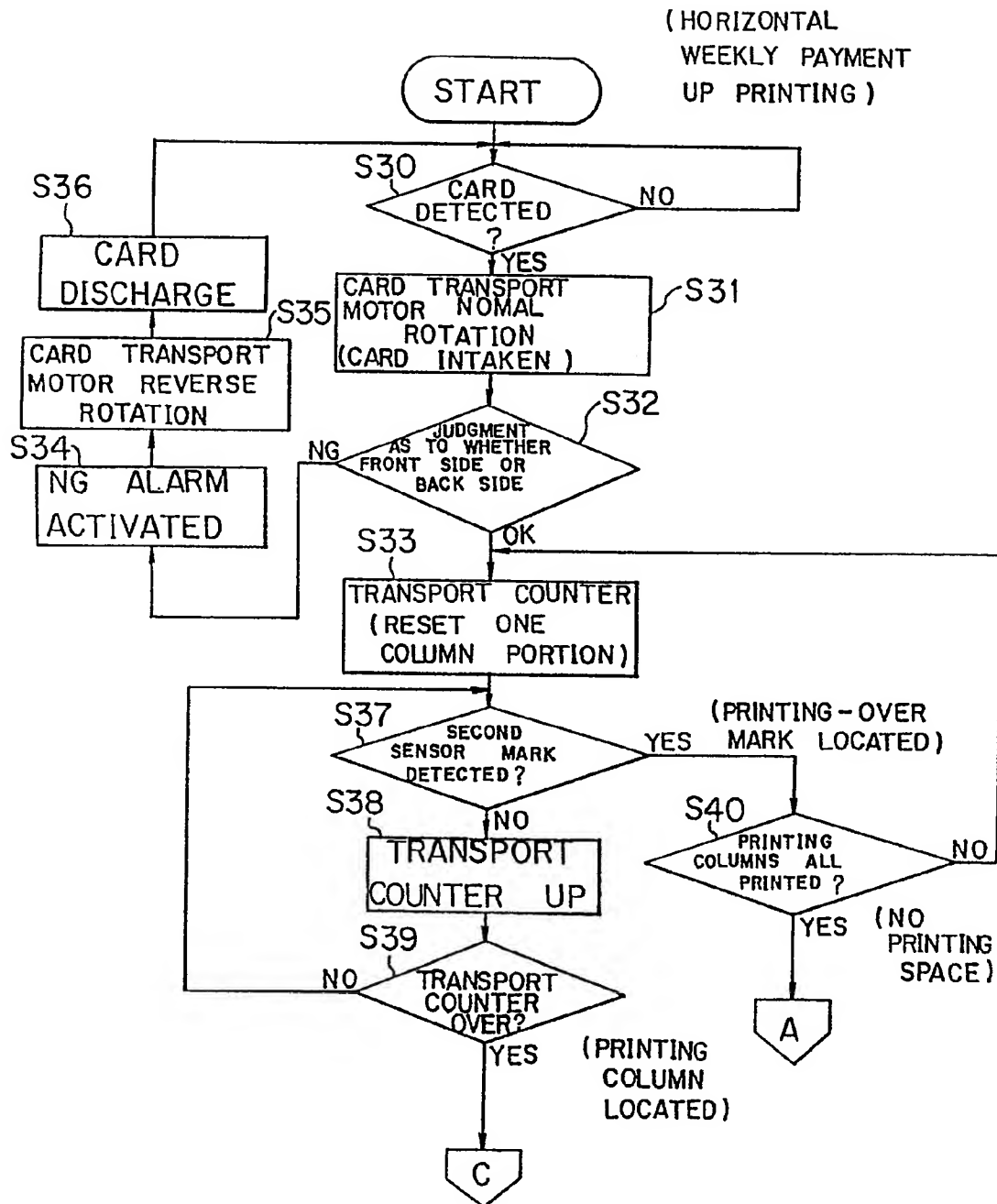
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FIG. 7

(HORIZONTAL WEEKLY PAYMENT
DOWN PRINTING)

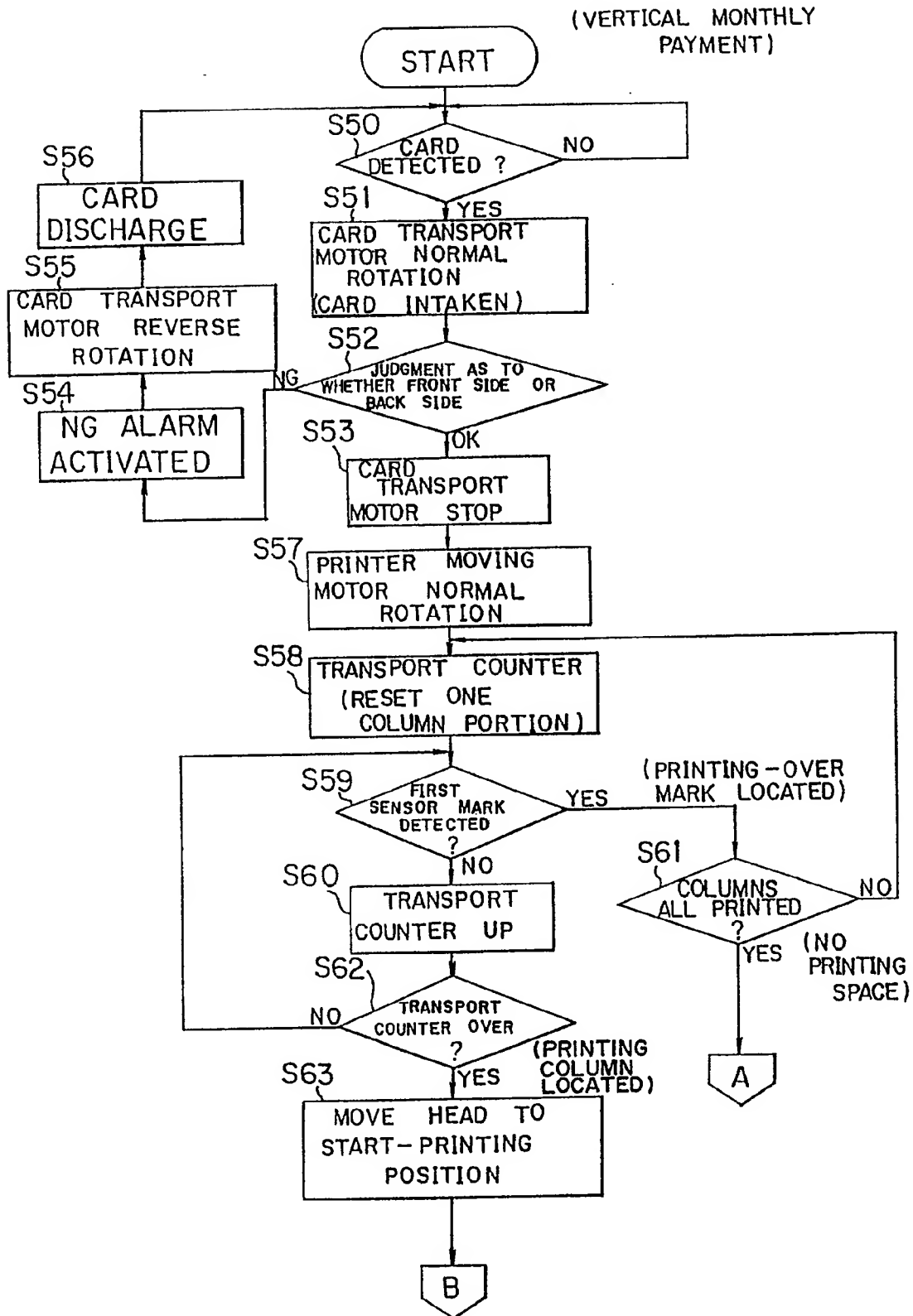
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FIG. 8



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FIG. 9



PRINTING POSITION DETERMINING APPARATUS FOR TIME RECORDER

BACKGROUND OF THE INVENTION

[Field of the Invention]

This invention relates to a printing position determining apparatus for a time recorder capable of determining, very simply and correctly, a printing position of a printer relative to a time card inserted into the recorder.

[Brief Description of the Prior Art]

A printing system of a time card can be largely classified into two types; one is a vertical monthly payment system as disclosed in, for example, Japanese Utility Model Publication No. Sho 61-17498, in which day columns of the month, as shown in Fig. 1, are formed on a time card in a vertical direction thereof, and columns for printing various working data such as IN and OUT time, early arrival, overtime, etc. are formed in a lateral direction of the corresponding vertical columns, and the other is a horizontal weekly payment system as disclosed in, for example, Japanese Patent Publication No. Hei 2-56710, in which day columns of one week, as shown in Fig. 5, are formed on a time card in a lateral direction thereof, and vertical columns are formed from the corresponding day columns of the week, so that IN and OUT time data of that day can be repeatedly printed in the same

vertical column.

The vertical monthly payment system employs either of two printing systems; one is a mechanical printing system in which a time card is moved upward or downward (up the card or down the card) to a predetermined printing column in order to determine the printing position once a day and thereafter, a printer such as dot printer is actuated for printing, and the other is an automatic printing system in which an electronic time recorder capable of automatically controlling the printing in accordance with a program and a time card on which individual codes are recorded are used, and the time recorder automatically determines the printing position in accordance with such read individual codes so that the printing would be made in such determined printing position.

On the other hand, the horizontal weekly payment system employs either of two printing systems; one is a mechanical printing system in which the printing column of a time card is moved in a lateral direction once a day, and when IN and OUT are repeated in a day, the printing column of the time card is punched together with working data or an edge of a time card is cut out by a punching die as discussed in, for example, Japanese Utility Model No. Sho 52-19619, in order to serve it as a guide for the next printing position, and the other is an automatic printing system, in which the printing position is automatically determined in accordance with in-

dividual codes recorded on the time card using an electronic time recorder as in the vertical monthly payment system.

As mentioned above, in any of the vertical monthly payment system and the horizontal weekly payment system, there are a mechanical printing system and an automatic printing system using an electronic time recorder. Recently, a development of a switchable time recorder in which one unit of time recorder can be selectively used both for a vertical monthly payment system and for a horizontal weekly payment system was demanded in view of manufacturing cost, maintenance, etc.

However, it was technically difficult to use a single unit of time recorder both for the vertical monthly payment system and horizontal weekly payment system because the vertical monthly payment system and horizontal weekly payment system are completely different in the mechanical system as mentioned above. Although both systems can be commonly used in the automatic system by changing a program, the time card is required to record thereon individual codes and therefore, the time recorder is required to have a function for reading such individual codes as well as a memory function. This inevitably makes the time recorder complicated in structure and high in manufacturing cost. Therefore, it was difficult to achieve the intended object to employ the both systems in a single unit of time recorder in an economical way.

In view of the foregoing, the applicant of the present invention has proposed an improved time recorder as disclosed in Japanese Patent Publication No. Hei 2-56710, in which working data are printed in the printing column of a time card together with a printing position mark, so that a new printing position can be detected by detecting this printing position mark by a detector at the time a time card is inserted next. This means a success of development of a semi-electronic (handy type) time recorder which is capable of detecting a printing position using a time card on which no individual code is recorded, and which can be selectively used for both the vertical monthly payment system and horizontal weekly payment system.

However, since the time recorder disclosed in the above Japanese Patent Publication No. Hei 2-56710 is designed such that a printing position mark detector is disposed at a midway (specifically, in an intermediate position between an insertion slot and a printer) of a guide way in order to read the printing position mark from an inserted time card, a corresponding number of detectors to the number (7 for the horizontal weekly payment system, and at least 4 for the vertical monthly payment system) of printing columns is required. Therefore, it had the shortcomings that it takes a long time from the detection of the printing position mark to the determination of the printing position, it is very

difficult to correctly determine the printing position for both the vertical monthly payment system and horizontal weekly payment system based on only this printing position mark, a complicated and expensive program and a mass storage device are required in order to achieve this, and the printing position is unable to be determined when the printing for the detection of the printing position mark is not clear. All these factors make it very difficult to practice the above-mentioned time recorder.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a time recorder, in which by using only one unit of time recorder and by changing a part of software, both the vertical monthly payment system and horizontal weekly payment system can selectively be coped with, a printing position can be rapidly and correctly determined for any of the two systems by two detectors in total and one simple program, so that working data can be printed in a correct position of a time card, and a printing position mark can be clearly printed so that the same can be read whenever necessary.

To achieve the above object, there is essentially provided a time recorder, in which a card transport motor is actuated to cause a card transport roller to transport the time card into the recorder when a card detector has detected

an insertion of a time card, working data and a printing position mark are printed in a predetermined column of such inserted time card by a printer, the printing position mark is detected by a mark detector in order to determine a new printing position when a time card is inserted next, and a printing is effected in such determined position by the printer, a printing position determining apparatus for said time recorder being characterized by:

(1) said printer being provided with a first mark detector mounted thereon in a vertically central portion thereof and in a position ahead by at least one column in a moving direction of said printer, and with a second mark detector mounted thereon in a higher position than said first mark detector by at least one column; and

(2) said first mark detector mounted on said printer is provided with a density detection function adapted to detect density of said printing position mark when said printer is returning to an original position thereof, said first mark detector being provided with auto-return means for causing said printer to repeat the printing in the same position when the detected density is not dark enough, and with alarm means for issuing an alarm when repetition of said printing has exceeded a predetermined number of times.

Since a printing position determining apparatus for a time recorder according to the present invention is con-

stituted such as mentioned above, the following functions are obtained.

① By virtue of the feature of the above (1), the two mark detectors mounted on the printer make it possible to selectively cope with any of the vertical monthly payment system and horizontal weekly payment system, and the printing position can be rapidly determined. That is, in the vertical monthly payment system, in any of the down the card system and up the card system, the first mark detector mounted on a vertically central portion of the printer reads the printing position mark in order to immediately determine the next printing position in accordance with a lateral movement of the printer, on the other hand, in a case of the down the card system in the horizontal weekly payment system, wherein IN and OUT data are printed side by side starting from the top of the time card, the second mark detector mounted on an upper side of the printer detects the printing position mark from the time card now under transportation in order to immediately determine the next printing position, on the contrary, in a case of the up the card system wherein IN and OUT data are printed side by side starting from the bottom of the time card, the first mark detector reads the printing position mark in order to immediately determine the next printing position. Accordingly, in any of the printing systems, merely by using a single unit of time recorder and by chang-

ing a part of software, the printing can be effected correctly, rapidly and economically.

② By virtue of the feature of the above (2), the central first mark detector exhibits the function for detecting a printing density at the time the printer is returning to its original position, and the printing is repeatedly made until the printing position mark becomes dark enough for reading. Accordingly, it never occurs such problems that a wrong printing position is determined or a new printing position becomes unable to be determined because of a failure of correct reading of the printing position mark or because of an incorrect reading thereof. On the other hand, in a case the printing position mark remains unclear in spite of repeated printing, an alarm is issued. Therefore, an incorrect determination of a new printing position based on an unclear printing position mark can be effectively prevented.

As apparent from the foregoing, the above-mentioned shortcomings inherent in the prior art apparatus can be obviated.

Many other features, and advantages of the present invention will become manifest to those skilled in the art upon making reference to the detailed description which follows and the accompanying sheet of drawings.

BRIEF DESCRIPTION OF THE DRAWING

Fig. 1 is a side view, partly in section, of a time recorder equipped with a printing position determining apparatus according to one embodiment of the present invention;

Fig. 2 is a plan view of a printer portion incorporated with the present invention;

Fig. 3 is a side sectional view of the printer portion incorporated with the present invention;

Fig. 4 is a block diagram showing an electric constitution of the present invention;

Fig. 5 is a front view of a time card showing one printing example of a horizontal weekly payment system in which a printing is started from the top;

Fig. 6 is a front view of a time card showing one printing example of a horizontal weekly payment system in which a printing is started from the bottom;

Fig. 7 is a flowchart for explaining a processing procedure of the horizontal weekly payment system in which a printing is started from the top;

Fig. 8 is a flowchart for explaining a processing procedure of the horizontal weekly payment system in which a printing is started from the bottom; and

Fig. 9 is a flowchart for explaining a processing procedure of a vertical monthly payment system.

DETAILED DESCRIPTION OF THE EMBODIMENT

One preferred embodiment of a printing position determining apparatus for a time recorder according to the present invention will be described in detail with reference to the accompanying drawings.

Fig. 1 is a side view, partly in section, of a time recorder equipped with a printing position determining apparatus according to the present invention. In the Figure, the numeral 1 denotes a recorder body, 2, an inlet slot for a time card P (see Figs. 2 and 3), 3, a card guide, 4, a card detecting sensor disposed at an upper end portion thereof, 5a, 5b, 5c, card transport rollers rotated by a card transport motor 5M, and by a driving gear 5T, 6, a sensor for judging whether the surface now under judgment is a front side surface or back side surface (hereinafter referred to as the "front/back judging sensor") by reading a front/back judging cutout PA1 or PB1 which is formed in a time card PA or PB as shown in Figs. 5 and 6, and 7, a dot printer disposed at a lower end portion of the card guide 3.

The dot printer 7, as shown in Figs. 2 and 3, comprises a carrier 7b with this printer 7 mounted thereon, and a ribbon case 7R, and adapted to print a working data and a printing position mark MK in a predetermined printing column of the time card P transported between a head 7a and a platen 12. Furthermore, in the above-mentioned Figure, the numeral 8 denotes a cam shaft for moving the dot printer 7 in a

lateral direction. The arrangement being such that when a motor 9M is actuated, a driving gear 9T is rotated, then bevel gears 9a, 8b are rotated in association with the rotation of the driving gear 9T, then the cam shaft 8 is rotated to cause a guide pin projecting from a bottom surface of the carrier 7b to be engaged in a cam groove 8a formed in a peripheral surface of this cam shaft 8, thereby to axially move the dot printer 7 in a lateral direction.

In Fig. 3, the numeral 3 denotes a first mark detector 10 mounted in a vertically central position of the dot printer 7 and in a position ahead by at least one column portion of the time card P in a lateral moving direction (reciprocally moving direction), and 11 denotes a second mark detector mounted on the dot printer 7 through a mounting arm 11a in a higher position than the first mark detector 10 by at least one column of the time card P. This first mark detector 10, in case the time card is of a vertical monthly payment system, is operated to read the printing position mark MK from each printing column on the time card P in accordance with the lateral movement of the dot printer 7 and immediately judge the next printing position based on the reading result such obtained, and it is, in case the time card is of a horizontal weekly payment system, operated to read IN and OUT time data starting from the bottom of the time card PB as shown in Fig. 6 and judge the next printing

position. Likewise, in case the time card is of the horizontal weekly payment system and IN and OUT time data and the printing position mark MK are to be printed first from the top as shown in Fig. 5, the second mark detector 11 is operated to read the printing position mark MK in each printing column and judge the next printing position.

The first mark detector 10 further includes a sensor function able to detect printing density of the printing position mark MK printed together with the time data when the dot printer 7 returns to its original position after the printing is over. In the present invention, if the printing density is thin as a result of the density detection made by the first mark detector 10, the dot printer 7 is moved again in order to double strike the printing position mark MK in the same position, and this procedure is repeated until the density satisfies a predetermined criterion, in other words, until the mark MK becomes dark enough for the mark detectors 10, 11 to read. When the repetition has exceeded a predetermined number of times (e.g., three times), an NG alarm device 18 shown in Fig. 1 is actuated to produce a sound or indication representing NG in order to alert its user.

Fig. 4 is a block diagram showing an electric constitution of the above-mentioned present invention. In the Figure, the numeral 13 denotes a CPU, 14, a memory comprising

a ROM and a RAM, and 16, an interface circuit connected between the CPU 13 and the memory 14 through a bus 15. The interface circuit 16 is connected with the card detecting sensor 4, the card transport motor 5M, the front/back judging sensor 6, the dot printer 7, the printer moving motor 9M, the mark reading first sensor (first mark detector 10) also served as a detector of printing density, the mark reading second sensor (second mark detector 11), and the NG alarm device 18. The interface circuit 16 is connected with a clock circuit 17 adapted to output a reference time signal. The arrangement being such that all of afore-mentioned elements are actuated, under the supervision of the CPU 13, in accordance with a system program stored in the memory 14.

Next, the steps of procedure for determining the printing position by the present invention and the steps of procedure for printing both the working data and the printing position mark MK will be described with reference to the flowchart shown in Figs. 8 and 9. For practicing the horizontal weekly payment system, it is programmed such that the dot printer 7 is located in a printing column of each day of the week beforehand, and for practicing the vertical monthly payment system, it is likewise such programmed beforehand that the card transportation is stopped in a printing column position of each day of the month.

The flowchart of Fig. 7 shows the steps of procedure for

printing the IN and OUT time data starting from the top and down to the bottom, as shown in Fig. 5, in the horizontal weekly payment system, and the details of the procedure are as follows.

Step S1: It is judged whether the card detecting sensor 4 has detected the insertion of the time card PA or not. If detected, i.e., if the time card TA has been inserted, it goes to the next step.

Step S2: The time transport motor 5M is rotated normally to transport the time card PA downward along the guide way 3.

Step S3: During the transportation of the time card PA, it is judged whether the surface of the time card PA now under judgment by the front/back judging sensor 6 is correct or not. If correct, it goes to Step S4. If not correct, it goes to Step S5 to actuate the NG alarm device 18 and then the procedures of Steps S6 and S7 are carried out to send back the time card PA.

Step S4: The second sensor 11, prior to the dot printer 7, scans the printing column of the time card PA coming from above and judges whether the printing position mark MK exists or not. If yes, it goes to Step S8. If not, it goes to Step S9.

Step S8: The detection of the printing position mark MK is continued by the second sensor 11 and it is judged whether

all lines have been printed or not. If all lines have been printed, then it goes to Step S18. If not, the next printing column to the line detected last is judged as a printing position, and then it goes to the next Step S10.

Step S9: If the printing position mark MK could not be detected in Step S4, and if the printing position mark MK could not be detected here again in spite of checking as to all columns, the uppermost column is judged as a printing position and then, it goes to Step S10. If the checking as to all columns is not over, it goes back to Step S4 for rechecking.

Step S10: The card transport motor 5M is controlled to move the time card PA to the printing column position as judged. After the movement, the procedure of Step S11 is carried out in order to stop the card transport motor 5M.

Step S12: The printer moving motor 9M is rotated in a normal direction to move the dot printer 7 in a lateral direction for printing.

Step S13: Current time is printed in the printing column as judged.

Step S14: The printing position mark MK is printed at the end of the printing column where the current time has been printed.

Step S15: The printer moving motor 9M is rotated in a reverse direction to move the dot printer 7 back to the

original position.

Step S16: During the movement of the dot printer 7 back to the original position, the first sensor 10 reads the printing position mark MK printed.

Step S17: The first sensor 10 is caused to check the density of the printing position mark MK. If OK, then it goes to Step S18. If NG, then it goes to Step S21.

Step S18: The dot printer 7 is returned to a predetermined home position. Then, the procedure of Step S19 for rotating the printer moving motor 9M in a reverse direction, and the procedure of Step S20 for discharging the card are carried out, respectively, to finish up the procedures.

Step S21: On the other hand, if it is judged as NG indicating insufficient density in Step S17, then it is judged whether the number of times of the NG judgment has exceeded a predetermined number or not. If not, then it goes to Step S22 to move the printer moving motor 9M again in a normal direction, and the printing procedures of the printing position mark MK after Step S14 are carried out. This re-printing procedure is repeated within a predetermined number of times until the density reaches a predetermined criterion.

Step S23: If it is judged as "count-up" in Step S21, the NG alarm device 18 is actuated and then, it goes to the afore-mentioned Step S18.

Fig. 8 is a flowchart for explaining the steps of proce-

dure for printing on the time card PB starting from the bottom to the top in the horizontal weekly payment system as shown in Fig. 6. The procedures explained here are those in Step S33 and Step S37 to Step S39, wherein the printing position mark MK is detected by the second sensor 11, and the column higher by one column than the column in which the printing position mark MK was printed last is judged as a printing column. All the other procedures are almost the same to those for the horizontal weekly payment explained with reference to Fig. 7, wherein the time card PB is printed starting from the top to the bottom, and therefore, detailed description will be omitted.

Fig. 9 is a flowchart for explaining the steps of procedures in the vertical monthly payment system. The procedures explained here are almost the same to those of the flowchart for the horizontal weekly payment system explained with reference to Fig. 7 wherein the printing is effected starting from the top to the bottom, except that the transportation of the time card P is stopped in a predetermined printing column position in accordance with the program in Step S53, the dot printer 7 is moved in a lateral direction in Step S57, the printing position mark MK is detected by the first sensor 10 in Step S59 to Step S62, and the printing column next to the printing column detected last is judged as a printing column. Therefore, detailed descrip-

tion will be omitted.

As described in the foregoing, according to a printing position determining apparatus for a time recorder according to the present invention, a single unit of time recorder can cope with all types of printing systems such as vertical monthly payment system (up the card/down the card), horizontal weekly payment system (up the card/down the card), and time cards having different pitches between the printing columns, merely by changing a part of software. Therefore, since complicated programs and a number of detectors (sensors) are no more required, manufacturing cost can be extensively reduced. Furthermore, since the density of the mark can be detected and double struck, where necessary, at the same time the printing position mark is detected, the printing position can be more correctly determined. Particularly, the present invention is most suitably applied to a time recorder having specifications for foreign countries for export purposes, which mostly employs the horizontal weekly payment system, a system where the printing is effected starting from the bottom to the top.

Although the present invention has been described with reference to the preferred embodiment, many modifications and alternations may be made within the spirit of the present invention.

WHAT IS CLAIMED IS:

1. A time recorder, in which a card transport motor is actuated to cause a card transport roller to transport the time card into the recorder when a card detector has detected an insertion of a time card, working data and a printing position mark are printed in a predetermined column of such inserted time card by a printer, the printing position mark is detected by a mark detector in order to determine a new printing position when a time card is inserted next, and a printing is effected in such determined position by the printer, a printing position determining apparatus for said time recorder being characterized by:

said printer being provided with a first mark detector mounted thereon in a vertically central portion thereof and in a position ahead by at least one column in a moving direction of said printer; and with a second mark detector mounted thereon in a higher position than said first mark detector by at least one column.

2. A printing position determining apparatus for a time recorder as claimed in claim 1, wherein said first mark detector mounted on said printer is provided with a density detection function adapted to detect density of said printing

position mark when said printer is returning to an original position thereof, said first mark detector being provided with auto-return means for causing said printer to repeat the printing in the same position when the detected density is not dark enough, and with alarm means for issuing an alarm when repetition of said printing has exceeded a predetermined number of times.

3. A time recorder substantially as hereinbefore described with reference to any one of the accompanying drawings.

4. A printing position determining apparatus substantially as hereinbefore described with reference to any one of the accompanying drawings.

Patents Act 1977

Examiner's report to the Comptroller under
Section 17 (The Search Report)

-21-

Application number

9206923.6

Relevant Technical fields

(i) UK Cl (Edition K) B6F: FAM, FAV, FKD, FKG, FKH. FG
G4T: TCA
(ii) Int CL (Edition 5) B6C: CVD, CVG, CWD, CWK
B41J-011/46 G07C-001/06

Search Examiner

F G MILES

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

18 JUNE 1992

Documents considered relevant following a search in respect of claims

1

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
	NO CITATIONS	

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

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